



## **Anthropogenic and weathering effects on the geochemistry of the Kumho River**

**Y. Kim**, E. K. Nam, B.-K. Kim, Y.-H. Kim, H.-Y. Jung, and D.-H. Jung

Department of Geology, Kyungpook National University, Korea (ygkim@knu.ac.kr / Fax: +82 39505362 / Phone: +82 539505360)

Chemical analysis and isotope studies were carried out to analyze factors affecting the geochemistry of the Kumho River located in southeastern part of Korea. This river rises from Pohang and runs through Daegu which is the third largest city in Korea, and meets the Nakdong River with total length of 114.6km. This study area is mainly composed of Youchon Group and Hayang Group of the Mesozoic Cretaceous formation. The former is composed of volcanic rocks and the latter of sedimentary rocks including carbonates. But the river flows through mostly sedimentary region. Chemical analysis shows that the dissolved ion concentrations in this river water are increased due to the weathering and polluted factory wastes, municipal wastes, and fertilizers as river flows to the lower stream from the upper stream. Especially Ca and  $\text{HCO}_3$  are dominant in the upper stream which runs through the area composed of sandstone and shale with carbonates such as calcite. In the lower stream, dye factory complex and downtown area are nearly located, which consequently makes Na and  $\text{SO}_4$  more dominant than Ca and  $\text{HCO}_3$ . Surface water samples were collected in May, July, and October, which represent dry, wet, and dry seasons respectively in Korea. As compared with the dry season, dissolved ion concentrations in the wet season are generally decreased due to the dilution caused by precipitation and Ca content is relatively increased in wet season. For the isotope study,  $\delta\text{D}$ ,  $\delta^{15}\text{N}$ , and  $\delta^{18}\text{O}$  were analyzed. Isotope data for  $\delta^{15}\text{N}$  are in the range of 4.5-18 ‰. The  $\delta^{15}\text{N}$  values increase from the upper stream to lower stream, indicating that most of the increased nitrate in this river system is from animal waste. In the dry season  $\delta^{15}\text{N}$  values are higher (from 10 to 18 ‰) than those in rainy season. During the rainy season the rain water dissolved the nitrate in soil and this lower the  $\delta^{15}\text{N}$  value. The isotope values of  $\delta\text{D}$  and  $\delta^{18}\text{O}$  are mainly affected by the rain water and those two values are highest in rainy seasons. Considering all

the factors, dissolved ions in the Kumho River are originated from the weathering of carbonates and inputs of pollutant from factory complex and animal waste.